

Chapter 2 Linear Relations and Functions

2-1 Relations and Functions

Relation--set of ordered pairs

 $\{(2,5) (3,6) (4,7)\}$

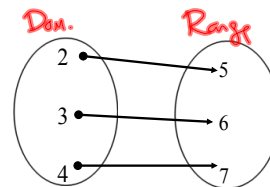
Domain--set of 1st coordinate

 $\{2, 3, 4\}$

Range--set of 2nd coordinate

 $\{5, 6, 7\}$

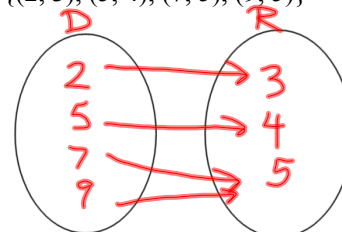
Function--relation in which each element in the domain is paired with exactly one element in the range



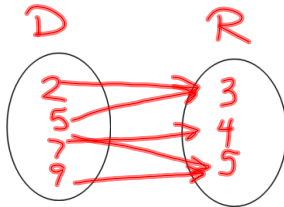
A function because every x is paired with exactly one y.

One-to-one--when every element in the range is paired with exactly one element in domain

(Every y has one x)

 $\{(2, 3), (5, 4), (7, 5), (9, 5)\}$ Fn? yes
1-1? no

$\{(2,3), (5, 3), (7, 4), (7, 5), (9, 5)\}$

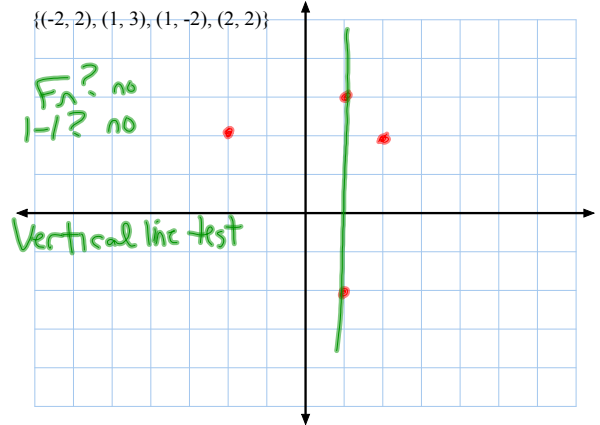


$F_n?$ no
1-1? no

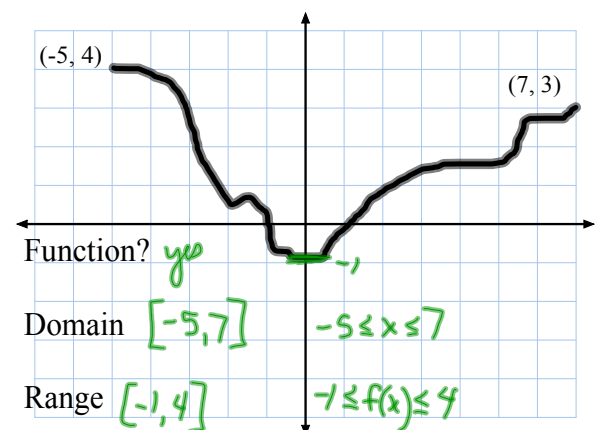
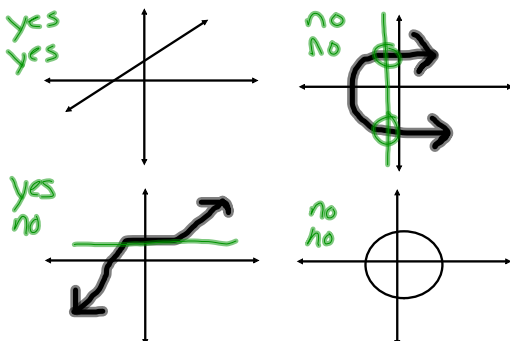
$\{(-2, 2), (1, 3), (1, -2), (2, 2)\}$

$F_n?$ no
1-1? no

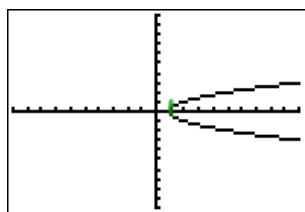
Vertical line test



Is it a function?

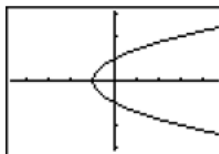


$$x = y^2 + 1$$

Function? *no*Domain $[1, +\infty)$ Range \mathbb{R}
 $(-\infty, +\infty)$

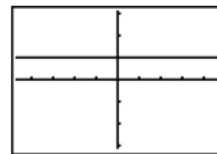
Worksheet

1.



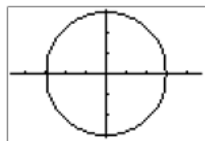
a. *no*
 b. *no*
 D: $[-1, +\infty)$
 R: \mathbb{R}

2.



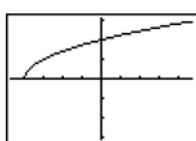
a. *yes*
 b. *no*
 D: \mathbb{R}
 R: $y = 1 \quad \{1\}$

3.



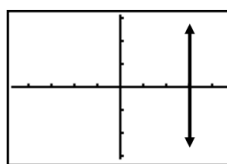
No
No
 D $[-3, 3]$
 R $[-3, 3]$

4.



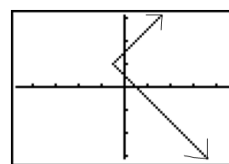
yes
yes
 D $[-4, +\infty)$
 R $[0, +\infty)$

5.

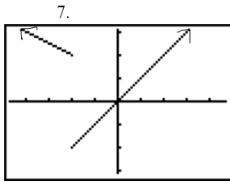


No
No
 D $\{3\}$
 R \mathbb{R}

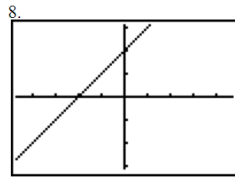
6.



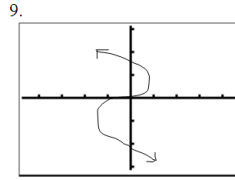
No
No
 D $[-5, +\infty)$
 R \mathbb{R}



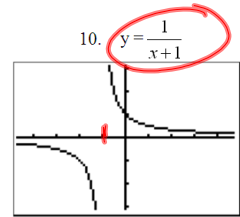
Not
Not
D: \mathbb{R}
R: $[-2, +\infty)$



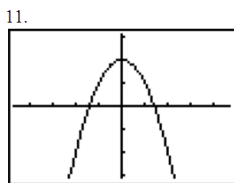
yes
yes
D: \mathbb{R}
R: \mathbb{R}



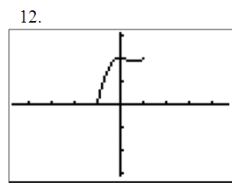
No
No
D: \mathbb{R}
R: \mathbb{R}



yes
yes
D: $\mathbb{R} \setminus \{-1\}$
R: $\mathbb{R} \setminus \{0\}$



yes
no
D: \mathbb{R}
R: $(-\infty, 2]$



yes
no
D: $[-1, 1]$
R: $[0, 2]$

Function Notation

$$f(x) = 3x + 2$$

$$f(2) = 3(2) + 2 = 8$$

$$g(x) = x^2 - 2x$$

$$g(-8) = (-8)^2 - 2(-8) = 64 + 16 = 80$$